MVE

Monitoring, Verification, and Evaluation (MVE) Unit
of the Egyptian Environmental Policy Program

Indicator Development

PROGRESS UPDATE

Support for Development of an Environmental Indicator System

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CHEMONICS EGYPT, AND ENVIRONICS

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List of Acronyms

CAIP	Cairo Air Improvement Program
CAPMAS	Central Agency for Public Mobilization and Statistics
COP	Chief of Party
EC	Executive Committee
EEAA	Egyptian Environmental Affairs Agency
EEIS	Egyptian Environmental Information System
EEPP	Egyptian Environmental Policy Program
EHP	Environmental Health Project
EIMP	Environmental Information Management Project
EMU	Environmental Management Unit
ENR	Environment and Natural Resources
FSU	Florida State University
GOE	Government of Egypt
MOSEA	Ministry of State for Environmental Affairs (Govt of Egypt)
MVE	Monitoring, Verification and Evaluation Project
NEAP	National Environmental Action Plan
OECD	Organisation for Economic Cooperation and Development
OEP	Organization for Energy Planning
PMP	Performance Monitoring Plan (USAID)
TSP	total suspended particulates
UNCSD	United Nations Commission on Sustainable Development
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WG	Working Group

1. Background

Indicators provide an effective means to evaluate trends in environmental conditions and associated economic and social parameters. They allow policy-makers and others, ranging from international donors to members of the public, to assess the benefits and costs of investments in the environment, and help prioritize future interventions. An effective environment and natural resource (ENR) management program includes relevant indicators based on current and forecasted environmental data and related information.

Many donor supported programs and projects have contributed to the development of environmental information systems in Egypt both inside and outside the Egyptian Environmental Affairs Agency (EEAA). Examples of ongoing donor efforts are the Egyptian Environmental Information System (EEIS) project, the Environmental Information and Monitoring Program (EIMP) project, the Egypt Pollution Abatement Program (EPAP), the Support to Environmental Assessment and Management (SEAM) project, and the Cairo Air Improvement Project (CAIP).

In addition, efforts within the Government of Egypt (GOE) regularly or on an *ad hoc* basis produce reports on aspects of the environment—including some environmental indicators—including:

- Report on the State of the Environment
- Reports to the United Nations Environment Program (UNEP) Mediterranean Action Plan (the “Blue Plan”)
- Reports to the Arab League
- Activities associated with Egypt’s National Environmental Action Plan
- Regular reports from specific projects/activities (e.g., the CAIP and EIMP monitoring networks).

Also, the United States Agency for International Development (USAID) routinely tracks and reports on environmental information in Egypt through its Performance Monitoring Plan (PMP) process.

However, the above-mentioned programs and projects represent somewhat fragmented interventions undertaken to meet one or another specific obligation or to produce reports of limited scope. Linking and coordinating the different component interventions into one coherent and consistent indicator framework, including the supporting data supply and information systems, remains to be achieved.

A combined data repository would be useful to help the GOE and USAID jointly develop and improve environmental policy programs. It would also contribute to developing effective responses to a wide range of pressing demands for regular information flows. Current GOE commitments to international agreements are one important example. Although much information has been collected at the project level, this information has not been aggregated or analyzed in a manner that demonstrates macro-level trends over the long run.

Egyptian Environmental Policy

Since 1994, environmental policy in Egypt has been formulated on behalf of the State by the Ministry of State for Environmental Affairs (MOSEA). Those policies are implemented by the Egyptian Environmental Affairs Agency (EEAA), whose work ranges from management and enforcement to basic environmental research.

As a cornerstone of the Middle East/North Africa region, Egypt's environmental problems and policies have attracted support from a number of international agencies, including USAID, which has supported environmental projects that include infrastructure, pollution control, and public awareness campaigns.

Egyptian Environmental Policy Program

USAID is currently supporting the Egyptian Environmental Policy Program (EEPP), a joint effort with the GOE that aims to integrate up-to-date environmental concerns with wider State policy. The Monitoring, Verification, and Evaluation Project (MVE)—one segment of the EEPP—evaluates the impact of EEPP policy reforms among its other duties. It works at the policy level, examining crosscutting issues and identifying barriers and constraints to policy reform implementation and solutions to overcoming these. MVE carries out analytical work, setting baselines in the sectors of focus.

In Tranche 1 (the first phase of work for the EEPP), MVE obtained input regarding important crosscutting problems. One area identified was that of environmental information—specifically a lack of indicators. Because of its functions this is an area specifically identified for MVE action in the original design for the Project. The design documents say that the MVE will maintain a database to respond to information requests to monitor indicators tracking broad environmental and related conditions in Egypt, including information such as:

- **State-of-the-environment**—measuring air and water quality, and measurements of biodiversity protection.
- **Health**—disease-based indicators, percent of population connected to water and sewer systems, and appropriate solid waste disposal practices.
- **Economic**—costs associated with diseases, power sector fuel efficiency, the value of services meant to protect the environment, and application of best practices to ensure sustainable tourism development along the Red Sea coastline.

MVE's charge from USAID is to monitor these types of indicators and maintain a database of information in order to respond to information requests. However, that role was predicated on the assumption that much information could be made available from secondary sources. MVE was not to duplicate existing efforts, but to ensure that (to the extent possible) existing and new data systems were compatible and that information could be shared with cooperating institutions.

MVE set out to investigate ways to cooperate with the GOE in its efforts to develop an ENR indicator program.

MVE–EEAA Cooperation on Indicators

This report presents the results of efforts to assist the EEAA in developing a set of environmental indicators and a system for managing them. The Mediterranean Action Plan (the Blue Plan) and Arab League—Egypt is a participant in both of those international efforts—and the mission of MVE within the EEPP are all part of the context for this work. Egypt is determining how it can most usefully contribute to those international activities in ways that will both provide data for international comparisons and build an indicator system useful for Egyptian decision-makers.

After consultation with EEPP partners regarding barriers and constraints to good policymaking, EEAA and the MVE moved ahead to carry out these activities. This report describes how MVE and EEAA have worked together, and details recommendations for development of the set of Egyptian environmental indicators.

Without the pre-existing context, MVE might have suggested a different strategy for development of the ENR indicator system. As it happens, the strategy adopted to build Egypt's participation in these regional efforts has several steps.

1. **Assess which indicators proposed by the Blue Plan and the Arab League are meaningful, useful, and important in the Egyptian context.** Some of the proposed indicators pertain to environmental conditions that do not exist in Egypt, such as those concerning forest management. Others are structured in ways that reflect European rather than Egyptian realities and need to be reframed to be useful in Egypt.
2. **Assess data availability.** While the lack of data for a particular indicator will not necessarily preclude its development it can make the effort much more difficult and costly in time and resources. Thus the availability of data is likely to be important at least in structuring Egypt's initial indicator set. In subsequent years, investments in primary data collection or work with existing sources may make it possible to add to the indicator list.
3. **Set priorities among the indicators** that are both important and feasible, to choose those which will be part of a first Egyptian Environmental Indicators Report. Because of the work that is likely to be needed to transform available data into the desired indicators, it will probably be necessary to limit the choice, at least at the start.
4. **Develop a road map** for how to build indicators in the areas selected for the initial indicator report.

Currently, at the time of this report MVE and EEAA are continuing to cooperate on development of indicators and an indicator system. The present work involves a deeper assessment of the existing data supporting the possible indicators. More information on this appears in Chapter 4.

2. ENR Indicator Development

Development Steps

The plan of action for carrying out this work suggested a series of steps:

1. Development of a comprehensive list of potential indicators by ENR sector/sub-sector, building on the "Blue Plan," the Arab League, USAID indicators, the National Environmental Action Plan (NEAP), and other sources. The indicators would be categorized and determination made of what data would be needed and where it might be found.
2. Identify potential data sources and evaluate available data for completeness and reliability. Identify focal points in the cooperating agencies and create an Indicator Working Group composed of those focal points along with representatives from EEAA. Develop criteria for evaluating the data sources and a framework for the collection and provision of data. Collect and review the information, and hold a workshop at which the representatives from the cooperating agencies present the framework.
3. Analyze the data to identify its strengths, weaknesses, and gaps, using the evaluation criteria developed in step 2.
4. Develop criteria for the assessment of potential indicators in step 1 above. Based on that assessment, prepare a list of indicators.
5. Determine the technical requirements for a decision support system on environment and natural resources based on the indicators proposed above. Determine how EEAA and the Indicator Working Group can meet those requirements.

MVE's original plan was to visit a number of key agencies and ministries to discuss with them the data they had collected, indicators they might already be compiling, and their interest and willingness to participate with EEAA in an ENR indicator program. Inter-ministerial cooperation and data sharing is often problematic, and some of the indicators proposed in the Blue Plan and by the Arab League might be seen to reflect upon the effectiveness of those agencies and ministries. MVE was cautious about taking an approach that might seem as if one agency would 'pass judgment' on others, especially since that agency—EEAA—had no authority to require them to do anything about environmental protection.

However, EEAA, eager to commence work on this, pursued a program slightly different from the one suggested by MVE, and MVE assisted as possible. In the fall of 2000, before USAID had approved technical cooperation, EEAA distributed a combined list of Blue Plan and Arab League indicators to a wide range of government ministries and agencies, along with a questionnaire asking which indicators on the list the agencies were already calculating and what additional indicators they were calculating. Responses to the questionnaire proved informative and will be included in future full reports. They also sent out initial information about a workshop on environmental indicators (originally to be held in January 2001, but whose date changed a number of times over subsequent months). The workshop was initially

intended to provide a venue at which government representatives provided information about their data and drew up an indicator plan.

The primary focus of MVE's activity became the indicator workshop. Although EEAA had scheduled the workshop and sent out invitations, it was primarily up to the MVE team to design its content. MVE focused on this task, seeking to ensure that it would serve as a significant building block for the development of an Egyptian environmental indicators program. During this process, EEAA visited a number of agencies to explain its vision of the process.

Indicator Classification

MVE reviewed the Arab League and Blue Plan indicator lists as the starting point for Egyptian indicator development, focusing on environmental and natural resource indicators rather than tackling the broader subject of sustainability or sustainable development indicators. MVE did not think it realistic for either the program or the agency to develop indicators in such areas for a number of reasons:

1. The whole area of sustainability indicators and measuring sustainability is poorly defined. While it is fairly straightforward to determine whether an observed trend is environmentally beneficial or harmful, it is much harder to know whether it will be sustainable, taking into consideration the tradeoffs between the elements of sustainability.
2. This work is supported by a EEPP, a USAID-funded program focused on environment, and EEAA, a GOE agency focused on environment. The entire domain of sustainability indicators would bring in a wide range of topics that are outside the purview of either the program or the agency, such as economic growth, higher education, mass communications, and so on.

The objective of the planned workshop was to introduce participants to the process of developing indicators for the environment and natural resources. A first step in preparing materials was to analyze other countries' indicators in order to develop a framework for considering the Blue Plan and Arab League lists. Of particular use in this process was the catalog of U.S. state environmental indicators prepared by Florida State University (FSU) for the United States Environmental Protection Agency (USEPA), which organizes thousands of environmental indicators into several dozen topic areas and describes all of the environmental indicators developed in state programs.[1] In each area, such as ambient fresh water quality, there are many different indicators addressing the same or similar issues. This catalog provides an excellent opportunity to consider a range of different approaches to each issue, and is a useful tool for those seeking to understand how indicators could be designed and adapted to specific circumstances.

[1] Florida Center for Public Management, Florida State University, October 1996, "Catalog of Environmental Indicators: State Environmental Goals and Indicators Project." Environmental Indicator Technical Assistance Series Volume 1. Prepared through a cooperative agreement with USEPA.

Indicator frameworks and lists developed by the Organisation for Economic Cooperation and Development (OECD) and the United Nations Commission on Sustainable Development (UNCSD) in response to Agenda 21 were also considered, although these are limited lists and do not provide any sense of indicators that might have been considered and rejected, or of the many ways in which indicators on a specific topic might be defined. Their developers aimed to provide the "best" set of indicators for global use, that is a set that might be developed in all countries to be used in comparative assessments. However, for their own needs the Egyptian government (and any other countries developing indicators) would be better served by assessing a fuller range of possible indicators as well as the choices of international working groups, and coming to their own decisions about the tradeoffs between international standardization and domestic information needs.

MVE found that the FSU indicator review provided important help in identifying areas not covered by the Arab League and Blue Plan lists, of which the most notable was environmental health. It was particularly helpful in providing a framework for organizing the Blue Plan and Arab League indicators. MVE identified those indicators pertaining to environment and natural resources and pulled them into a shorter list, referred to as the "List of 95." Then MVE classified them according to the environmental issues they address—e.g. air pollution, solid waste, biodiversity—making substantial use of the categorization offered by the FSU inventory. This list was then used in the preparations for the workshop.

3. ENR Indicators Workshop

The Workshop on Sustainable Development Indicators was held on 17–18 March 2001. Participants included representatives from EEAA, the Cabinet Information and Decision Support Center, and other ministries such as Agriculture and Electricity, other agencies, and MVE. A full list of participants is included in appendix B.

The workshop was designed to help build an understanding of the indicator work as a team process that would promote collaboration among a range of ministries and agencies. For the system to be adopted as a significant national product by many different ministries, all had to have both a sense of ownership of the results and a willingness to share data in order to produce them. By bringing the participants together in an event that cut across environmental concerns and areas of expertise, MVE sought instill that approach to the development of this system.

The workshop initially introduced participants to general indicator concepts and then asked them to begin the process of selecting a set of environmental indicators that would be useful in the Egyptian context, working from, but not limiting themselves to those suggested by the Blue Plan and Arab League. As the USAID PMP indicators were still under final review at the time of the workshop, and as these were focused on monitoring specific aspects of USAID programs, these were removed from consideration at the workshop. The combined 95 indicators that participants were to consider are listed in appendix C.

Workshop Program

Day 1, 17 March 2001

Opening Remarks were presented by Dr. Moussa Ibrahim Moussa, Head of the Central Department for Information, EEAA; Eng. Rafaat Radwan, Head of the Information and Decision Support Center, Egyptian Cabinet of Ministers; and Mr. Doug Baker, MVE Chief of Party. Dr. Moussa presented the international context for Egyptian indicator work and the role of EEAA as a participant in the Blue Plan process. Mr. Baker presented the role of MVE and EEPP and described the upcoming program.

Introduction to Indicators was presented by Dr. Joy Hecht. She described: what they are; differences between data, indicators, and indices; the pressure-state-response framework; and criteria for evaluating proposed indicators. She said the design of an Egyptian indicator system must reflect Egyptian policy-makers' needs for information rather than imitating systems designed by other countries. (Dr. Hecht’s presentation is included in appendix D.)

First breakout session saw participants divided into four groups facilitated by Dr. Khaled Fahmy and Dr. Tarek Wafik of MVE, Dr. Adham Ramadan of Environics, a subcontractor to MVE, and Dr. Joy Hecht, consultant to MVE, to carry out a set of exercises designed to bring home the points made in the introductory lecture. The working groups were to complete an "indicator assessment form" (figure 1) for each of 12 indicators from the Blue Plan and Arab League lists pre-selected by the MVE team. The indicators illustrated a number of the points from the lecture, and included some that

were well designed and others that were inadequate. Participants came to appreciate the need to understand how they intended to use indicators in order to design them, and the importance of tailoring them to the Egyptian context rather than assuming that indicators designed by international groups would be suitable for Egyptian use.

Each group was also asked to design two new indicators, one for health impacts of pollution and the other for fresh water quality in order to get at issues that are confronted when designing an indicator from scratch rather than analyzing one already developed.

The groups varied in how much they completed. One group only worked through four or five of the selected indicators, spending a good deal of time discussing each one, while other groups worked through all twelve. Not all groups added new indicators to those proposed by the Blue Plan and Arab League.

Day 2, 18 March 2001

Opening remarks were presented by Dr. Moussa of EEAA and Dr. Khaled Fahmy, MVE, who discussed the future of the indicator program. Dr. Adham Ramadan, Environics, spoke about the exercise for that day.

Second breakout session had participants reviewing the list of 95 environmental and natural resources indicators to establish priorities for inclusion in an Egyptian indicator system. The work was to have been carried out in three steps:

1. Participants were to go through the list considering whether the environmental problem captured by each indicator is important in Egypt. Indicators were to be ranked as high, medium, or low priority through this process.
2. For each indicator assigned high priority, the group was to consider whether it was sufficiently well designed to use with only minor modification, or whether it would need to be redesigned in order to be usable.
3. Finally, they would consider the extent to which data were available to calculate the indicator in question, and where such data might be found.

The second breakout session was intended to provide substantive information that would lead into further work on indicator development. The product of this session was a list of 13 areas for indicators—culled from the original list of 95—deemed to have top priority.

- Demography
- Solid Waste
- Hazardous Materials and Wastes
- Global Air Pollution
- Local Air Pollution
- Water Pollution
- Drinking Water
- Water Management
- Land Management
- Agriculture
- Energy
- Protected Areas
- Level of Effort on Environmental Management

A full summary of this breakout session is included as appendix E.

Closing session included several presentations.

- Dr. Moussa spoke about the Environmental Sustainability Index developed by the World Economic Forum in Davos, Switzerland in 2000, and pointed out Egypt's position as 76th out of 122 countries ranked. He then proposed five steps to follow the workshop:
  - EEAA will take the lead in forming a national committee on indicators, of which the workshop participants will be members.
  - EEAA will compile a full set of responses to its survey on existing indicators.
  - EEAA will analyze the results of both the workshop and the survey and report on them.
  - One-on-one meetings with individual ministries will be conducted to learn more about their indicators and data.
  - A set of action plans will be prepared to develop and estimate indicators, focusing on a relatively limited set that can be developed fully rather than aiming at great breadth from the start.
- Dr. Ahmad El Kholy spoke about the indicator work undertaken in the context of preparing the NEAP.
- Dr. Ramadan summarized major results of the morning's work sessions.

Dr. Moussa and Mr. Baker expressed thanks to the participants and the organizers.

Indicator Assessment Form

Indicator: _____

Where do you classify this indicator? (Do you agree with its classification on the overall table?)

_____ Pressure

_____ Ambient environmental quality - state

_____ Second-level environmental measure - state or response

_____ Human intervention to solve problems - response

_____ Effectiveness of human response - also indicate above whether it tracks changes in pressure, in ambient environmental quality, or in second-level environmental measures

Policy Relevance:

What is the significance of this indicator?

- What would an upward or downward trend in the indicator tell you?
- Is this very clear, or is the significance of changes in the indicator subject to many interpretations?

Figure 1. Indicator Assessment Form Used by Workshop Working Groups

4. Future Direction

Technical Focus

The workshop held in March (during Tranche 1 of the EEPP) identified areas of priority for indicators. MVE's role in continuing this effort has been one of support to EEAA's endeavors to build on the workshop results.

The indicators that might be developed within each priority problem area, the data on which they would be based, and the institutions that might be involved in building them needed to be defined. MVE considered the specific indicators within each problem area given high importance by the workshop participants, although not limiting the consideration to those. MVE assessed all of the indicators from the perspective of the criteria provided in the first day of the workshop, identifying and ruling out some that might be misleading or unclear. MVE identified overlaps among some items on the list of 95, which allowed it to combine indicators. MVE also considered the difficulty of developing the data on which some of the indicators might be based.

Taking into account all of these concerns, MVE is suggesting indicators within each problem area that might offer a manageable and useful start to developing Egypt's first environmental indicators set. The technical working groups in each problem area will need to consider these and other important indicators to compile an initial set for each matter. Undoubtedly, over time, additional indicators will be added to the system as data become available or priorities change and some of the original indicators will no longer be needed.

In most of the problem areas, more detailed underlying data would have to be available to calculate the indicators. Chapter 5 describes briefly what those data might be and how they would be used to calculate the indicators. In most cases, MVE expects that only portions of the necessary data will exist or be in a readily usable form. Where data are not available, those developing the indicators could take one of two approaches in the short run:

- Identify proxies for the recommended indicators that might provide a quick impression of the same issue without relying on the desired data; or
- Organize the data that are available, standardize them, and do other work to get existing data into as usable a form as feasible, then calculate the indicators as recommended.

The second approach is likely to take longer than the first, but MVE believes the payoff would be much greater. Well-organized data systems can be used for a wide range of analytical, planning and policy purposes, whereas proxy indicators can only flag the existence of a problem. MVE recommends that, although this effort is being conducted under the rubric of indicator development, the emphasis be on refining the data systems used both to calculate indicators and to analyze and solve problems.

Process

The discussion below sets out some considerations regarding indicator development in each of thirteen priority areas. With this information in hand, one can think about the sequence of steps required to go from here to Egypt's first Environmental Indicators Report.

Indicator Reporting Schedule

First, it is useful to think about what this report will be, and when it might be published. The Environmental Indicator Report might be very brief, showing this year's and the previous years' values for each indicator, with a few paragraphs of explanation. It would not be an analysis of the state of the environment, but rather a overview that the minister might report to the Cabinet, that the Parliament might consider in reviewing the budget, or that journalists might report on along with economic or financial statistics.

The Environmental Indicators Report should be updated as frequently as meaningful and practical. Aiming for annual updates may be appropriate, although some indicators, such as those on ambient air and water quality, might be updated much more often if they are based on ongoing monitoring. Such intermediate updates might be released simply as a one-page report or press release, perhaps on a monthly basis. A plausible schedule might be an annual overall indicator report with short intermittent reports on those indicators that lend themselves to frequent reporting.

MVE recommends that a date for publication of the first indicator report and a schedule for updates be set for 6–8 months in the future—i.e., late 2001 or early 2002. This would have a number of benefits:

- The date is neither unrealistically soon nor so far in the future as to allow the effort to lapse.
- A target date creates pressure to produce results in order to get the initial values for indicators in each area.
- A deadline brings realism to the areas of initial focus—elaborate indicators requiring extensive data work cannot be calculated within the time allowed.
- A schedule that includes regular updates ensures that as EEAA gathers information for the first report, it also sets up a system for ensuring that current data will routinely be available for calculation of updates and publication of subsequent reports.

Priority Areas

Thirteen areas of high priority were identified at the workshop. From among these, perhaps five or six should be selected and work undertaken for the first indicator report. Much work will be involved in starting to gather indicators, and it will not be feasible to make a full-scale effort in many areas at once. It is necessary, therefore, to sequence the efforts, beginning with a few areas to be covered by the first report and gradually adding more areas to subsequent reports as time allows.

Several criteria should go into the choice of areas of focus for the first report:

- Obvious importance of the problem in terms of the Egyptian environment and public health.
- Ease of developing indicators—it may be a good idea to start with areas that will provide fairly quick results, to build momentum and show results quickly.
- Data availability.
- Availability of other helpful resources—skilled, experienced technical staff and/or donor funding for data development.
- Opportunity to "piggy back" on other projects that are organizing data useful for calculating indicators.
- Priorities of the key institutions building the system, (e.g. EEPP is already doing much work on the Red Sea, EEAA may also have priorities in other specific areas).

Based on these kinds of criteria, MVE recommends that work for the first indicator report focus in the following areas:

1. **Air pollution**. This is a key environmental problem, ambient air quality data are available, at least for Cairo, and much of the data integration and analysis is underway through CAIP and EIMP.
2. **Water pollution**. Another key environmental problem with some ambient and emissions data available through EIMP and GOE ministries.
3. **Solid waste**. A third key environmental problem with some data integration and analysis already underway

There are solid data for these first three areas. The next five areas are more problematic, but are presented for EEAA to consider, along with other areas of major importance:

4. **Drinking water**. An important issue for public health.
5. **Biodiversity, conservation, and protected areas**. This area is one of high priority to USAID, but was not given high priority by the workshop participants. MVE, on behalf of USAID, suggests that EEAA reconsider this matter.
6. **Energy**. Data available through the Office of Energy Planning, Ministry of Petroleum, or other agencies might enable this indicator.
7. **Agriculture**. Data appear to be available.
8. **Land use/land cover**. Combining the land management category with parts of the agriculture category, this area would focus on an issue of perceived importance.

Indicator Development

Once four to six areas have been identified, subsequent work would continue in technical subcommittees made up of representatives from the different ministries or agencies concerned. In each area, this would involve a similar series of steps, carried out with facilitation from a technical team from EEAA with MVE support:

1. Meet with the workshop participants directly involved with the issue in question to identify key institutions (ministries, agencies, projects, inter-ministerial committees or

processes, etc.) and individuals. Insofar as possible, identify who works on which technical issues, and who may have data of use in indicator development.

2. Contact the institutions and people identified. Whether this should be done through a general meeting (within that technical area) or by meeting people individually must be assessed separately in each case, based on the judgment of the people who were at the workshop, the feasibility of meeting, the number of people involved, etc.
3. Discuss the indicators proposed for the area in question. Through an iterative process, determine kinds of data are available, what would be useful, what can be calculated, and so on. This will be done primarily through individual discussions with the individuals who produce and maintain the data being used to calculate indicators.
4. Once the data needed to calculate the indicators are clear, work out an agreement between EEAA and the other agencies or ministries involved specifying who has what kinds of access to the data, and who will work with the data to calculate the indicators. If EEAA is to work with data under control of other agencies, protocols will have to be established for what information is to be transferred to EEAA, and on what schedule, and a schedule for planned updates. If the agencies producing the data are to calculate the indicators for EEAA, protocols will have to be established specifying exactly what they are to calculate, using what data, and how data problems such as outliers and missing values will be handled. A schedule will have to be set for calculating the indicators and providing the results to EEAA.
5. Where considerable database manipulation, reorganization, or other management is needed to pull information into a form suitable for analysis or calculation of indicators, a plan will have to be drawn up for exactly what must be done and who will do it. This may be a stumbling block if resources are not available to cover the time required to do this work, either within the agencies with access to the data or within EEAA. If such data work is required, it is likely to be the most time-consuming part of the effort involved. As with the actual calculation of indicators, it will be necessary to work out which agencies produce the underlying data, who will do the data work, what will be transferred from other agencies to EEAA, and so on.
6. Calculate the indicators. Do any refinements that may be needed if the initial calculation surfaces errors or problems in the methodology.
7. Write the explanatory text that will accompany each indicator in the first report, and finalize the section of the report, including graphics or tables as appropriate.

The time required to carry out this process will depend on how well developed the underlying data are, how many different organizations are involved, how smoothly they work together to share data, and so on. For some subjects it may be quite easy, but for others it is going to be a complex process. The 6–8 month target date for release of the first report should be feasible, although this may depend on how much time is available from the EEAA technical experts in each field to push the process along and keep it moving.

Continuing Work

As noted above, since this progress report was prepared, MVE and EEAA have continued to cooperate in pushing forward the indicator development work along the path charted. Even as institutional and program planning questions (such as EEPP Tranche 2 plans and responsibilities) were being resolved, the important work continued of assessing the existing data and associated information systems and of forging working relationships with the most important institutional partners.

The sources of data required for these proposed indicators principally involve three institutions, representing the main information nodes in Egypt. These are the Egyptian Environmental Affairs Agency (EEAA) for environmental data, and the Information and Decision Support Center (IDSC), and the Central Agency for Public Mobilization And Statistics (CAPMAS) for other types of data (population, economy, natural resources etc.). It was decided to focus, at this first phase, on these three nodes based on the assumption that data located at these institutions, transferred from other institutions in Egypt (e.g. individual ministries), would be in a “transferable” format which would make their re-transfer and use in ENR indicators determination relatively straightforward, particularly in comparison to data existing in the individual ministries in a non- transferable format. Accordingly, data assessment forms were developed to be used by the three sources, in assessing data they have currently available. Absent or unavailable data would identify areas of gaps, which would need to be addressed in following phases. This work is ongoing in July and August 2001.

5. Indicator Construction and Data

MVE has compiled preliminary information on the 13 areas deemed by the workshop participants to have high priority. Each sub-section on specific sectors looks at possible indicators, needed data, data sources, quality of data, etc., and posits what is needed. These are in a separate report. The area of local air pollution indicators is included here, as an example of the construction of data indicators and the data required to make them meaningful.

Example: Local Air Pollution Sector Indicators

Local air pollution indicators cover emissions, ambient air quality, and measures of efforts to reduce pollution. Emissions indicators proposed by the Blue Plan include annual measures of sulfur oxides in SO_2 equivalents and nitrogen oxides in NO_2 equivalents. Such emissions estimates would likely be calculated based on data similar to those used for the greenhouse gas emissions discussed in the entry for global air pollution. Detailed information about industrial output, processes, fuel use, and combustion systems, and about consumption of oil-based fuels by type of vehicle are combined with standard emissions coefficients for different types of industrial and combustion processes to estimate emissions. Theoretically, these data are valuable; however they are difficult to develop.

Two ambient indicators are proposed. The first, from the Arab League, is a suite of measures covering ambient levels of ozone, nitrogen dioxide, nitrogen monoxide, total suspended particulates (TSP), and carbon monoxide. There is no specification of the frequency of measurement. The design of efficient monitoring systems with which to collect such ambient depends in part on information about emissions sources. However, that information is not sufficient to meet the needs described above. Thus the collection of ambient data will not at the same time meet the needs for estimating emissions.

The second ambient indicator, proposed by the “Blue Plan,” is the frequency of excess over the tropospherical ozone standard per year per measurement station. It is not clear why they propose this for only ozone, nor why the Arab League does not propose ozone measurements in its suite of ambient indicators. If the ambient data are available, indicators of the frequency of excess over standards are easy to calculate, though measures of the extent of excess over standards may be more useful. For this issue, emphasis should focus on building consistent databases on ambient pollution levels from which more aggregate indicators can be calculated. If the underlying data are available, it is possible to develop various aggregate indices of ambient air quality that could provide a simple composite indicator for use at the level of the nation as a whole or at the urban agglomeration level, for Cairo.

The Blue Plan proposes three indicators of measures to reduce pollution: public expenditure on abatement, share of agglomerations over 100,000 inhabitants with monitoring networks, and the share of clean fuels consumption in total motor fuels consumption. Concerning expenditures, it is not clear why they do not include private expenditure on abatement, which, if there is any effort at all to implement the ‘polluter pays principle,’ should be much more significant than public expenditure.

Expenditure data are interesting, but hard to estimate, especially once pollution controls have been in place for some time and process changes replace end-of-pipe control technology. Moreover, they are subject to a wide range of interpretations and are highly political. Industry will typically use them to argue that pollution control is too expensive and will hurt the economy. This can be quite misleading, however. Point source emission controls impose high costs when first introduced, but the costs drop sharply once the investments are in place and only operating costs remain. Presenting actual cost data from the first few years of a pollution control program will suggest that is going to be much more expensive than it actually will be once the initial investments are made. Of more relevance would be the projected costs of future emissions controls; however these can be difficult to estimate and are not actual data usable for indicators development. Moreover, if the data on costs of pollution control are not balanced with estimates of the resulting benefits, the information will be slanted against the environmental measures. Placing a monetary value on the benefits of pollution control for such comparisons is a research and modeling effort, not a data-development process, and there is still considerable uncertainty about the methods to be used. For all of these reasons, while pollution abatement expenditure data are very interesting and should be compiled if possible, they do not lend themselves to the calculation of clear, easily interpreted indicators.

The other two indicators are less complex. The share of agglomerations over 100,000 with a monitoring network may not be a very useful measure because it says nothing about the adequacy of the network; it could include one monitoring station, or a sufficiently dense network to capture all the information desired. The share of clean motor fuels consumption will track a gradual shift from conventional to cleaner fuels. This is essentially a proxy for a more complex measure of mobile source emissions. If the more detailed data described above were available, this indicator would be easily calculated on that basis. If those data were not available, this might be a useful measure of the effectiveness of the mobile source portion of the country's emissions reduction campaign.

The workgroups placed somewhat more emphasis on emissions and ambient data than on level of effort data. Group 1 recommended only the suite of indicators on ambient air quality. The other groups recommended most of the emissions and ambient data, and were mixed on the level of effort data. Given the various limitations of the effort indicators, it may be more useful to begin work with emissions and ambient air quality.

It is worth noting that the list of 95 does not include any indicators on health implications of air pollution or on indoor air pollution. All of the workgroups considered the possibility of developing environmental health indicators as part of the first day's exercises, and some of them recommended the development of such indicators the second day. Demonstrating a causal relationship between ambient environmental quality and health is difficult, however. Ongoing work on health impacts of lead in Egypt modeled the expected impacts based on population densities, ambient air quality data, and internationally established dose-response functions, rather than trying to show an actual impact. Moreover, the health data that might be used to try to show at least a correlation are difficult to obtain, inadequate, and potentially misleading. While this is an issue of great importance, it may be more cost-effective to focus on overlaying spatially disaggregated ambient air quality with population density to identify populations at greatest risk, and simply assume that the expected health impacts result.

None of the workgroups discussed indoor air pollution, although Law No. 4, Year 1994, the "Environmental Law," calls for non-smoking areas within public closed areas. The same law addresses indoor air pollution for work premises, and inspections are conducted regularly for industrial workplaces. Indoor air pollution in residences due to cigarette smoke, cooking fuels (more in rural than in urban areas), and infiltration of outdoor pollution (in urban areas) would appear of less concern in Egypt at this time.

Data Desired

- Emissions from point and mobile sources, organized by industrial sector, households, and government. Such data would be calculated based on industrial output, process, energy use, and combustion process data, mobile source fuel use and vehicle type data, and emissions coefficients probably obtained from international sources. This is a lot of work. The resulting data are useful for a wide range of analysis, planning, and policy purposes, as well as for indicators development.
- Ambient air quality data measuring a range of pollutants. These data are also useful for a wide range of purposes and for indicator development. The level of spatial disaggregation, or density of the monitoring network, must be determined based on established technical procedures for such networks and on the uses to be made of the data.
- Pollution abatement expenditure data by industry, households, and government. These data are useful for a wide range of analytical purposes, but may lend themselves less to indicators development.
- The above environmental data should be complemented with data on population densities at sufficient spatial disaggregation to permit analysis of environmental health impacts.

Possible Starting Indicators

- Total emissions by pollutant, or emissions indices for sulfur oxides and nitrogen oxides.
- Trends in ambient air quality, measured using air quality indices like those being developed by the Cairo Air Improvement Program (CAIP) or other indices.

Data Sources/Institutions Involved

- For emissions, the underlying data may come from the Ministries of Industry, Energy, Transportation, and others; considerable work would be required to estimate emissions.
- For ambient data, CAIP and EIMP, both within EEAA, should be able to provide data on NOx, SOx, and greenhouse gases.
- Others?

This will definitely involve a coordinated process to pull together the available data and develop indicators. Since this is one of Egypt's most obvious environmental problems, it probably warrants attention as part of the first round of indicators developed.

MVE experts have started to investigate sources for data with the Central Agency for Central Agency for Public Mobilization and Statistics (CAPMAS) and the Cabinet Information and Decision Support Center (IDSC), but much of this will necessarily have to be the responsibility of EEAA, as the agency that will build the relationships with other ministries and agencies that would allow for the exchanges of information required. MVE will continue to work with the agency on this initiative during the next phase of the EEPP.

Appendix A Summary of Indicator Workshop Second Breakout Session

Process and a Multiplicity of Approaches

During the second breakout session, each group developed its own process for carrying out the steps planned. In Dr. Hecht's group, for example, the participants spent close to an hour reading through the indicators silently and individually assigning priority to each indicator. Participants were advised to assign priorities based on the importance to the country of the environmental issue addressed by the indicator, and were encouraged to think in terms of 12–18 priority indicators. Their priority assignments were then tallied in a voting process, without discussion. Those indicators that received unanimous or "all-but-one" designations—of which there were 11—were considered to be high priority and were discussed further with respect to design and data availability.

Each of the other groups went through the list as a group and discussed each indicator, coming to consensus on which ones were high, medium, and low priority. In general, participants were in consensus on assignments of high priority, but had more trouble distinguishing between medium and low priority indicators. This process led to designating far more indicators as being of high priority than did the process used by Dr. Hecht's group. Dr. Ramadan's group designated 43, and Dr. Wafik's 71 as high priority. Dr. Fahmy's group ran out of time after considering 70 indicators; of those, 61 were designated as high priority.

This pattern might be due to two factors. First, only Dr. Hecht encouraged participants to limit the number of high priority indicators; the other three facilitators did not give any guidance on how many indicators should fall into each category. Second, by discussing each indicator together, the participants may have influenced each other. If one person strongly supported an indicator and no one else had strong feelings, they could simply give it high priority. Individuals might be unlikely to argue with each other, since there was no pressure to reduce the number of indicators given high priority. In the voting system, as opposed to the discussion-and-consensus system, individuals voting for low priority were less likely to feel that they were directly blocking an indicator that someone else felt was very important, so they may have done so more easily.

The discussion and consensus approach probably led to a better understanding of the full set of indicators than the voting approach, but it was less useful in setting priorities. Were this to be done again, it might be desirable to combine the two. The groups might be told how many indicators could be given high priority, for example, by positing that "the minister has to give the Cabinet a brief review of the environmental situation, so we can only use X number of indicators." They could then choose the indicators by discussion and consensus, or discuss them one-by-one as a group and then vote in private.

One group, that of Dr. Ramadan, felt that 43 indicators was too many to accord high priority. After going through the list once, they established a set of criteria for determining priority, and went through the list again to apply them. They also established that priority was not strictly importance but should be understood to refer to the time for developing the indicator, so high priority ones would be done first and low priority ones put off to last. Their criteria were:

- How well the indicator addresses key Egyptian problems
- Egypt's obligation to address the issue covered by the indicator under an international treaty or agreement
- Indicator's importance for decision-making
- Data availability (notwithstanding that this was a separate issue for review)
- Potential availability of donor funding to address the issue
- Whether the indicator was already being calculated and should be given high priority.

While the second review using the criteria changed some of the priority assignments, the total number of high priority indicators was unchanged.

The issues of indicator design and data availability are less interesting from a process perspective. Dr. Fahmy's group gave the most attention to the issue. His group included a large contingent of technical staff from EEAA who knew much about available data and ongoing indicator work. His group also included the representative of the Ministry of Agriculture, which has done a lot of indicator work already and had submitted a detailed response to the EEAA survey on ongoing work. Consequently, they approached the discussion of indicators from a technical perspective, considering in detail both the suitability of design and the availability of data for each of the indicators they discussed. They proposed about 25 new or significantly refined indicators, including all of the indicators now being calculated by the Ministry of Agriculture that were not on the list of 95.

This outcome relates to another issue: how the composition of the groups affected their work. The initial plan had been to allow participants to select their own groups for day 1. For day 2, there were two possibilities: to group people by area of focus, or to group them to ensure a wide range of areas of expertise in each group. A decision was made to do the latter, because otherwise the representatives of ministries unrelated to the environment (e.g. education, finance, broadcasting, etc.) would be left without logical placement. However, participants ended up going instead to the same groups they had been in the first day. Dr. Ramadan's group did have a good balance of participants from all ministries. Dr. Hecht's, which included people who had self-selected for working in English, was heavily weighted towards people who worked on pollution, and the distribution of their priorities reflects this. Dr. Fahmy's group was heavily weighted towards those from EEAA, while Dr. Wafik's group included mostly those from non-environmental ministries. Moreover, the people from the same ministry tended to stay together in selecting groups, lessening the diversity. It would, therefore, have been preferable to assign people to groups to ensure a good mix in each group.

Results

Because the four groups used quite different processes to identify important indicators, and they did not all attempt to establish priorities among those considered important, it is hard to draw conclusions from the statistical results of these working groups. Our approach therefore has been first to identify the environmental problem areas in which participants seemed to agree that indicators were needed, and then to consider which indicators warrant more work within each area.

The table summarizes the establishment of priorities by the four groups, showing how many indicators were accorded high priority in each problem area. The numbers in parentheses in the left-hand column show, for purposes of comparison, how many indicators there were in each category on the list of 95. In the case of Dr. Fahmy's group, the table also gives the number of new indicators in each category. This figure is a bit hard to determine in practice, because in many cases it is not clear what constitutes a new indicator and what constitutes a revision of an already-existing indicator. This is particularly the case for the indicators already calculated by the Ministry of Agriculture, about some of which MVE does not yet have enough information to determine whether in fact they differ from indicators already proposed by the "Blue Plan" or Arab League.

Priority-setting results

Indicator Category (number of indicators)	Joy Hecht	Adham Ramadan	Tarek Wafik	Khaled Fahmy	
				Priority	New
Demography (2)	1	2	2	2	
Pollution - General (2)			2		
Solid Waste (10)	1	8	10	9	1
Hazardous Material (3)	2	1	3	2	3
Global Air Pollution (2)		2	2	2	
Local Air Pollution (7)	1	3	7	6	3
Water Pollution (12)	2	4	10	10	3
Drinking Water (4)	3	2	4	3	
Water Management 5)	1	1	5	5	
Land Management (5)		3	5	5	
Fisheries (6)		1		5	
Agriculture (6)		1	4	5	15–20
Minerals (2)			1		
Energy (4)		2	4	4	
Protected Areas (4)		3	4	Not completed	
Biodiversity (2)			2		
Coastal/Tourism (7)		2	2		
Transportation (3)		2			
Disasters (3)		1	1		
Level of effort in environmental protection (6)		4	4		
TOTAL	**11/95**	**43/95**	**71/95**	**58/70**	

Because the groups developed their own processes for classifying indicators by priority, and in particular because they did not identify the same number as high priority, one cannot simply tally their results. By looking at the choices, however, one may be able to get some sense of which problem areas should receive first attention in further indicator work, and which might be put off until later.

Perhaps the easiest items to identify are the areas given relatively low priority. These appear to include the "general pollution" category (these were indicators not specific to one kind of pollution, which may be picked up within specific pollution areas), fisheries, and minerals. Other areas that are less clear, but also seem to get relatively little attention are

transportation, coastal areas/tourism, biodiversity, and disasters. This leaves 13 areas where indicator development could begin: demography, solid waste, hazardous materials, global air pollution, local air pollution, water pollution, drinking water, water management, land management, agriculture, energy, protected areas, and the level of effort in environmental protection. Each of these is considered in further detail in the report on specific data sectors.

Appendix B: Participants in the Indicator Workshop

1. Ministry of Agriculture

Ibrahim Labib Mekail

2. Ministry of Education

Samira Ali Yehia

Hamdy El Mihy

3. Ministry of Higher Education

Hussein Soubhy Hussein

Ehab Hassan Abou El Soud

Ministry of Health And Population

Mohamed Essam Shaban

Wageh Shehata

4. Ministry of Housing, Utilities And New Urban Communities

Hisham Hassn Badran

Hanaa Hassan Morsy

5. Ministry of Manpower And Immigration

Hassan Sayed Ali

Mohamed Abdel Fattah

6. Ministry of Economy And Foreign Trade

Hedayat Henry Faltas

7. Minister of Public Enterprises

Abdel Ghafar Allaithy

Alaa Sabet

8. Ministry of Tourism

Gamal Taha Abou Elala

Laila Mohamed Habib

9. Ministry of Information

Taimour Anwar Goher

Mohamed Khalaf Alla

10. Ministry of Transportation

Mohamed Abdel Sabour El Sayed

Laila El Zahiry

11. Ministry of Electricity And Energy

Mona Tawfik

12. Ministry of Planning And International Co-Operation

Abdel Moneim Mohamed Gad

13. Ministry of Local Development

Samir Ghareeb

14. Hazard Mitigation Center (Cairo University)

Hisham Mohamed El Araby

Mohamed Ibrahim EL Anbaawy

15. Institute of Environmental Studies And Research (Ain Shams University)

Abdel Kawi Kalifa

Mohamed Nasr Farid

Coordination, Climate Change Unit

Ahmed Abd Rabou Mohsen

16. Egyptian Environmental Affairs Agency

Michael Smith

Hanaa El Gohary (SEAM)

Magdy Ahmed Allam

Saed Arafa (IDSC)

Ahmed Mohamed El Tawansy (IDSC)

Mohamed Gaber Mohamed (IDSC)

Mousa Ibrahim (ICC)

Moheeb Abdel Sattar Ibrahim (ICC)

Ibrahim Khalil Hamza

Tarek Eid (EHSIMS)

Hebtalla Fathy Ahmed (EIMP)

Ahmed Aboul El Soeud (EIMP)

Mouneir Wahba (CAIP)

Ekhlass Gaml El Din (CAIP)

Alyaa Fouad (SDI)

Manal Hussein (SDI)

Ahmed El Kholy (NEAP)

17. Nature Conservation Sector

Waheed Salama Hameid

Taher Ahmed Issa

18. **Arab Office For Youth And Environment**

Lamiaa Magdy

Emad Adly

19. Ozone Unit

Salwa El Tayeb

20. Environics

Adham Ramadan

21. MVE

Douglas Baker

Adel Naguib

Khaled Fahmy

Tarek Wafik

Reem Ali

Deena El Alfy

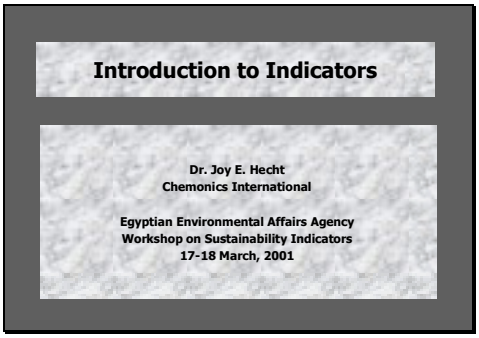
Joy Hecht

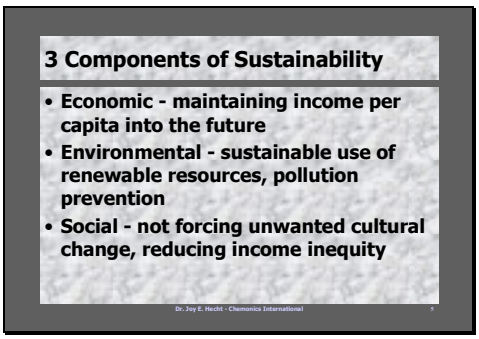
Essam El Amry

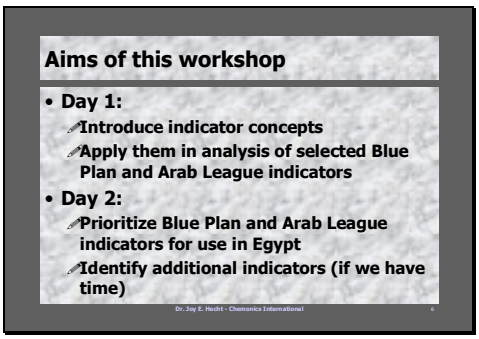
22. Program Support Unit

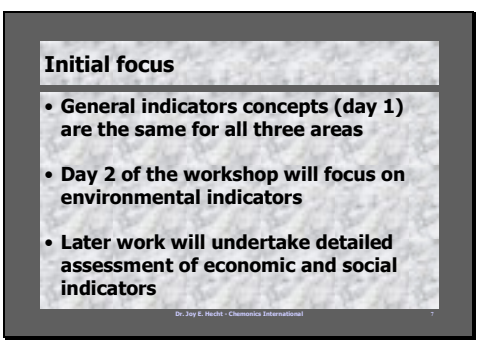
Hany Shalaby

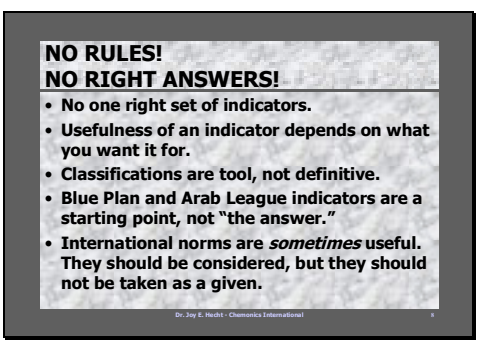
Appendix C: Presentation by Dr. Joy Hecht for workshop opening session











What is an indicator?

- A flag to alert people - the public, the government, the press, etc. - to a problem
- It DOES tell you need to pay more attention to the issue
- It DOES NOT usually tell you what to do about the issue

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Example: Dead fish

- In 1998 dead fish appeared in rivers in the eastern USA.
- People close to them became sick.
- Their presence was a flag.
- Much analysis was required to identify the problem and solve it.
- Now - re-appearance of the fish would be a more meaningful flag.

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Data, Indicators and Indices

- Data - detailed statistical information used to analyze policy questions or manage operational activities
- Indicators - simple summary measures used to flag problems or successes, track progress, etc.
- Indices - composite weighted measures including a variety of different factors in one measure.

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Example: Dead fish again

- Number of dead fish seen is an indicator of seriousness of the problem
- Extensive data on fish, water quality, temperature, and agricultural practices needed to analyze the source of the problem.
- Sometimes indicators are useful, sometimes data are needed.

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Example: agricultural potential

Policy issue: where to allocate water?

- *Data* - soil characteristics, cost of building irrigation infrastructure, proximity to markets, population
- *Indicators* - composite soil measures
- *Index* of agricultural potential - weighted measure that includes physical measures, crop yields, cost of infrastructure, sale prices, time to market, etc.

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Pressure-State-Response (PSR) framework

- Developed as a way to organize indicators according to how they will be used
- Initially conceived in Canada - 1979
- Adopted by OECD in 1980s
- Used widely worldwide, with various modifications

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Pressure

- Human activities that affect the environment, e.g. pollution
- Refined to differentiate:
  - human activities, e.g. trash burning
  - natural processes that interact with human activities
  - social processes that place indirect pressure, e.g. population growth

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State

- Ambient environmental quality - e.g. particulates in air, chemicals in water
- Indirect impacts of ambient change on humans or other species:
  - particulates in air cause illness in humans
  - chemicals in water harm aquatic life

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Response - original concept

human actions (policy, regulations, financial incentives, etc.) to reduce pressures or mitigate their impact.

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Response - refinements

- Indirect changes discussed under "state" could be considered responses to pressures
- Effectiveness of human responses may also be considered a second-level response - though they may also measure pressure or state.

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Refined PSR Framework

- Pressure
- Ambient environmental quality (state)
- 2nd-level effects on environment or health (state or response)
- Human intervention (response)
- Effectiveness of intervention (could also be pressure, state, or 2nd-level effect)

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PSR Framework: who cares?

- It has international use, therefore is worth knowing about, even if we are using our own refined form of it.
- Placing your issue or indicator in the framework helps you clarify what you care about, in order to define the indicator more precisely.

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Example: Refined PSR

- Pressure - factory creates air pollution
- Ambient environment - particulate levels in air are high (state)
- Secondary effect - illness (state or response in conventional PSR framework)
- Human intervention - factory emissions control campaign (response)
- Effectiveness indicators:
  - less emissions - pressure
  - lower particulate levels - state
  - less illness - secondary change

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Examples: PSR Classification

- Time series trend in coral reef species diversity - 2nd-level effect, effectiveness of intervention
- Factory emissions - pressure, effectiveness of intervention
- Occurrence of lead poisoning - 2nd level effect, effectiveness of intervention
- Public awareness of risk of lead poisoning - pressure, effectiveness of intervention (public education)

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Evaluating indicators

Basic criteria for evaluation:

- reasonable people agree on whether a change in the indicator is good or bad
- we know what might cause that change
- we can measure it reliably, at reasonable cost.

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Evaluating indicators, cont'd

Policy relevance

- Is change good or bad? What could cause that change? Are answers to these questions unambiguous?
- Scale - spatial (administrative or ecological boundaries), time
- Comparison with standards, targets, history?
- Who would use it? Government, civil society, business, the public, journalists?
- Used how? Day-to-day management, planning, etc.

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Evaluating indicators, cont'd

- Measurability
  - Can you calculate this indicator?
  - Are the data already available, or easy to collect? Who has them?
- Alternatives - does this indicator get at the issue better than other indicators might?

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Example: fecal coliforms

- Proposed indicator: average level of fecal coliform bacteria in river over time
- Fecal coliforms are evidence of untreated human sewage present in the river, therefore risk of disease.
- Why we care? Public health; drinking water, food supply (fish, irrigation), recreation (swimming)

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Refined PSR: fecal coliforms

- Ambient environmental indicator - it measures the state of water quality
- Effectiveness measure - it would be used to assess the effectiveness of a campaign to improve sewage treament

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Policy Relevance: fecal coliforms

Significance of a change:

- Higher levels clearly worse for public health, therefore bad.
- Increased population could lead to increase.
- Failure of sewage collection or treatment to could lead to increase.

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Scale: fecal coliforms

- Scale
  - Spatial - Measure fecal coliforms at specific points. Is it meaningful to average over space? How much detail do you need over space? As much as you can afford?
  - Time - How often should you measure? Is there seasonal variation? Is there variation with weather?
- Choice of scale may depend on use to be made of indicator.

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Use: fecal coliforms

Use

- Mid-term planning - assess health risks and need for improved sewage treatment. Moderate density of monitoring network acceptable.
- Emergency management - flag leaks in sewage network. High density and frequent monitoring needed.

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Targets: fecal coliforms

What would we compare with?

- International safe standards for drinking, swimming, fishing.
- Comparison with previous years.
- Comparison with other countries is not meaningful, but this is an internationally accepted measure of importance.

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Fecal coliforms, finished:

- Measurement:
  Sampling water quality is routine - protocols are established.
- Alternatives:
  For focus on health, might want to link to data on water-borne disease.

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Example: trash on ocean floor

- Proposed indicator:
  "density of solid waste disposed in sea" - measured by number of items disposed and density of waste on seabed
- Refined PSR Classification:
  - Pressure?
  - State
  - Effectiveness of interventions

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Policy Relevance: seabed trash

- Significance of change:
  More trash is worse. Increase expected over time; rate of increase would depend on number of boats. Policies to reduce trash could slow the increase.
- Scale - could average over any area
- Use - determining whether interventions are needed to reduce trash, assess interventions. Mid-term planning.
- Target for comparison - No net increase in trash.

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Seabed trash, finished

- Measurement:
  - how is an "item" defined? Counting total number of items does not make sense.
  - Density vs. volume, depth, etc.?
- Possible Alternatives:
  - water clarity - sediment
  - grime on bottom-dwelling shellfish - sediment, biological contamination
  - aerial sampling - counting number of non-degradable items (cans, bottles)

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Example: air pollution

- Proposed indicator: share of days per year when air quality standards are exceeded somewhere in the region
- Policy Relevance:
  - Higher frequency is worse; however it likely to always be 100%, therefore not informative.
  - Scale - by monitoring station, across urban area? More meaningful by monitoring station.
  - Use - assess effectiveness of air quality programs. Identify emergencies.
  - Target for comparison - No exceedences.

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Air pollution example, cont'd

- Measurement:
  - measuring air quality is routine
  - misinformation in spatial aggregation
  - density of the network matters
- Alternatives - useful for management:
  - amount by which standards are exceeded
  - where standards are exceeded

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Next Step

Participants will work in small groups to assess a list of suggested indicators and develop some new ones, following the same questions.

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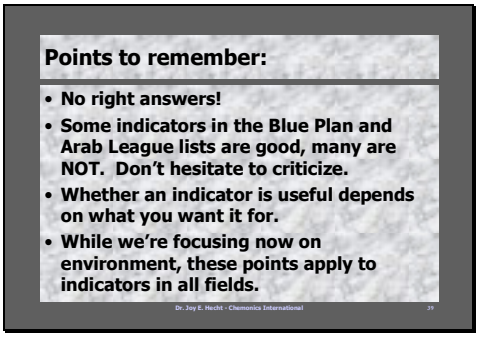
Points to remember:
• No right answers!
• Some indicators in the Blue Plan and Arab League lists are good, many are NOT. Don't hesitate to criticize.
• Whether an indicator is useful depends on what you want it for.
• While we're focusing now on environment, these points apply to indicators in all fields.
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Appendix D: List of 95 indicators utilized in indicator workshop

Summary of Blue Plan and Arab League ENR Indicators

Subject	Type[i]	Source	Data needed	Comments
Human demography				
1. Population growth rate	P	Blue plan	▪ Total population at different times	The population growth rate is defined as the average annual rate of change of population size during a specified period.
2. Total fertility rate	R	Blue plan	▪ Population of women of different ages within the fertility period. ▪ Number of births to women of different ages within the fertility period.	This is the average number of children that would be born to a woman in her lifetime if she were to pass through her childbearing years experiencing the age specific fertility rates for that period.
Pollution - general				
3. Existence of monitoring programs concerning pollutant input	R	Blue plan	▪ Yes/ no	This indicator is defined by the existence or otherwise of a national programme for the operational monitoring of the country.
4. Minimization of waste production	R	Blue Plan	▪ Whether or not there are policies and measures taken in the country with the purpose of minimizing waste production.	The indicator is a sheet that sets out if there are policies or measures taken in the country with the purpose of minimizing

			If yes, what are these polices and measures?	waste production.
Solid Waste				
Quantity of waste				
5. Generation of municipal solid waste .	P	Blue Plan	▪ Total weight of municipal solid waste produced per inhabitant per year.	Municipal solid waste refers to waste collected by or on behalf of municipalities. It includes waste originating from households, municipal services (roadway, parks), similar waste from commerce and trade, office buildings, institutions like schools, hospitals, government buildings, and small businesses whose waste is treated in the same installations as those collected by the municipalities. The definition excludes waste from municipal sewage network and treatment, as well as municipal construction and demolition waste.
6. Municipal solid waste per capita	P	Arab League (1996)	▪ Amount in kg of municipal solid waste generated per capita per day	
7. Composition of municipal wastes	S	Blue Plan	▪ Total weight of municipal wastes in a given period. ▪ Weight of the components of the municipal waste (paper and paperboards, textile, glass, plastics, metals, food	This indicator is defined as the average composition of municipal waste expressed as a percentage of the various items which make it up, by weight.

			waste garden waste, etc..) during the same period	
8. Generation of industrial solid waste.	P	Blue Plan	▪ Weight of solid waste produced by the industrial sector per inhabitant per year.	The indicator is defined as the annual production of solid waste by industry measured by weight at the place of production.
Management of solid waste				
9. Destination of household wastes.	R	Blue Plan	▪ Total volume of household wastes. ▪ Volume of household wastes which are landfilled. ▪ Volume of household wastes incinerated. ▪ Volume of household wastes composted. ▪ Volume of household wastes recovered for recycling.	
10. Collection rate of household wastes	R	Blue Plan	▪ Total volume of household waste produced in a given period. ▪ Volume of household wastes that are collected and treated or stored during the same period.	This indictor is defined as the proportion by volume of the total production of household waste that is collected and that enters the treatment/storage processes organized by local authorities.
11. Recycling and reuse of solid waste	R	Arab League (1996)	▪ Total amount of solid waste generated at source per capita ▪ Amount of solid waste recycled/ reused per capita	This is the amount of solid waste recycled/ reused from the total amount of waste generated at source per capita
12. Disposal of municipal waste	R	Arab League (1996)	▪ Annual local generation of solid waste	This indicator is concerned with amounts of waste collected and disposed

			▪ Amount of waste collected and disposed of legally	of legally expressed in tons per defined unit of annual local generation
Expenditure / level of effort indicators				
13. Cost recovery index of municipal wastes	R	Blue Plan	▪ Net costs of collection, transportation, treatment and disposal services of municipal wastes, which are covered by taxes paid by users. ▪ Amount of taxes paid by users for the above mentioned services.	The net costs used is the gross costs after deduction of onward sales proceeds
14. Expenditure for solid waste management	R	Arab League (1996)	▪ Expenditure for solid waste management expressed in USD$	This indicator is concerned with the amount of private or local funds spent on the collection and management of solid wastes
Hazardous Substances and Wastes (includes solid, gases, and liquids, into water, air and land				
15. Generation of Hazardous Waste.	P	Blue Plan	▪ Total volume of hazardous waste produced per year.	This indicator is defined by the total volume of hazardous waste produced per year by industrially generated waste or other waste, established in accordance with the Basel Convention definition of waste and other related conventions.
16. Imports and exports of hazardous wastes.	P	Blue Plan	▪ Total amount of hazardous wastes subject to transboundary movements as defined by the Basel Convention.	
17. Area of land	S	Blue	▪ Surface area of sites contaminated by	This indicator corresponds to the

contaminated by hazardous wastes.		Plan	hazardous waste.	surface area of sites within a country contaminated by pollution related to the stocking of hazardous waste, and where no appropriate measures have been taken to prevent negative effects on human health and the environment.
Global Air Pollutants (Greenhouse Gases, stratospheric ozone, etc.)				
18. Emissions of greenhouse gases	P	Blue plan	▪ Emissions of carbon dioxide for a given year. ▪ Emissions of methane for a given year. ▪ Emissions of nitrous oxide for a given year.	This indicator is the national aggregate of the main man-made greenhouse gas emissions: carbon dioxide, methane and nitrous oxide
19. Consumption of ozone depleting substances	P	Blue plan	▪ Sum of annually consumed quantities of organic substances containing chlorine or bromine. ▪ Sum of production, import minus exports of controlled substances within the meaning of the Montreal protocol.	Ozone depleting organic substances in Montreal protocol are: CFCs, Halons, Other CFCs, Carbon tetrachloride, Methyl chloroforms, HCFCs and methyl bromide
Local Air Pollution				
Emissions indicators:				
20. Emissions of sulphur oxides.	P	Blue Plan	▪ Amount of sulphur oxides released expressed in SO_2 equivalent per year.	This indicator relates to national man-made sulphur oxides emissions (SO_x) expressed in sulphur dioxide (SO_2) equivalent tones released.

21. Emissions of nitrogen oxides.	P	Blue Plan	▪ Amount of nitrous oxide released expressed in NO_2 equivalent per year.	This indicator measures the national man-made nitrous oxides emissions (NO_x) expressed in nitrous dioxide (NO_2) equivalent tones released
Ambient Air Indicators:				
22. Ambient air pollution in urban areas	S	Arab League (1996)	▪ Quantity in weight/m^3 of ozone, nitrogen dioxide and nitrogen monoxide, as well as Total Suspended Particulates ▪ Quantity in volume/ m^3 of carbon monoxide.	Pollution in ambient air for ozone, carbon monoxide, total suspended particulates, nitrogen dioxide and nitrogen monoxide.
23. Frequency of excess over air standard (Ozone).	S	Blue Plan	▪ Number of days that undergo peak pollution by tropospherical ozone per year per measurement station.	
Pollution Control Expenditure (or level of effort) indicators:				
24. Expenditure on air pollution abatement.	R	Blue Plan	▪ The public investment expenditure for air Pollution and Abatement Control (PAC) including end of pipe investment and process-integrated investments. ▪ Public current expenditure for air PAC. (e.g salaries, maintenance expenditure, etc..) ▪ Public subsidies to private sector. ▪ Revenues from by-products of PAC activity.	The indicator is defined as the investment and current expenditure actually incurred for air pollution abatement, and carried out by public and private sectors. For the public sector, the expenditure relating to the general administration, the control of actions to prevent, reduce and eliminate air pollution,, as well as the monitoring of the environment, is included. Initially, the indicator is

			▪ Fees and charges from private sector for PAC activities.	limited to the public sector.
25. Share of agglomerations over 100,000 inhabitants equipped with an air pollution monitoring network.	R	Blue Plan	▪ Number of agglomerations with more than 100,000 inhabitants. ▪ Number of agglomerations with more than 100,000 inhabitants with an air pollution measurement network available.	The indicator measures the portion of agglomeration with more than 100,000 inhabitants with an air pollution measurement network available.
26. Share of clean fuels consumption in total motor fuels consumption	R	Blue Plan	▪ Total amount of fuels consumed by the motor vehicle fleet. ▪ Total amount of clean fuels consumed by the motor vehicle fleet.	clean fuels include: unleaded petrol, liquid petroleum gas (LPG) and pressurized gas.
Water Pollution				
Emissions indicators				
27. Industrial releases into water	P	Blue plan	▪ Amount of daily industrial untreated waste discharges into continental and coastal waters ▪ Amount of pollutants in the industrial waste discharge	The pollutants involve the following main classes: oxidable substances, suspended solids, toxic substances, metals, phosphoric substances and hydrocarbons.
28. Release of nitrogen and phosphorous into coastal waters	P	Arab League (1996)	▪ Annual discharge rate of nitrogen and phosphorous from inland resources	
29. Density of the solid	S	Blue	▪ Number of solid waste items dumped on the sea	This indicator is defined as the number

waste disposed in the sea		plan	bed ▪ The density of solid waste on the continental shelf ▪ The density of solid waste on the continental slope ▪ The density of solid waste on the bottom	of items of solid waste dumped per km^2 of seabed.
Ambient water quality indicators				
30. Concentration of fecal coliforms in fresh water	S	Arab League (1996)	▪ Concentration of fecal coliforms in fresh water.	This indicator identifies the percentage of fresh water sources with a concentration content of fecal coliforms higher than the limits set by WHO for potable water.
31. The biological oxygen demand in water	S	Arab League (1996)	▪ The biological oxygen demand in fresh water bodies	This indicator reflects the quality of water available to consumers
32. Average quality of coastal waters	S	Blue plan	▪ The bacteriological quality of seawater ▪ The concentration of chemical pollutants in seawater and in sediments ▪ The concentration of pollutants in living matter (fish, birds, mammals)	The bacteriological quality involves measuring of fecal coliforms. Pollutants measured include heavy metals, organochlorinated compounds (PCB, DDT, etc) and hydrocarbons, also total phosphorous and total nitrogen as well as chlorophyl a. The pollutants measured in the living matter are heavy metals, PCB, DDT and hydrocarbons.
33. Coastal	S	Blue	▪ Identification of hot	The ambient water

water quality in some main hot spots		plan	spots (areas at risk from pollution), i.e. urban areas or areas with significant industrial pollution ▪ Measurement of BOD, COD, nutrient, P&N, TSS, oil hydrocarbon, heavy metals, persistent organic pollutants (POP), radioactive substances, fecal coliform bacteria and E-coli	quality measures are weighted, and hotspots are ranked according to potential impacts on: 1. public health 2. the quality of drinking water 3. leisure 4. aquatic conditions 5. fauna 6. socioeconomic conditions
34. Quality of biophysical milieu	S	Blue plan	▪ The marine phanerorgamous meadows area ▪ The total area of the infra-coastal area (0-5 m) ▪ The part occupied by Posidonia oceanica ▪ The total area pf water plant communities	Periodic returns every 5-10 years allow the measurement of expansion or contraction of these sea grass colonies.
Expenditure / level of effort indicators				
35. Wastewater treatment rate before sea release for coastal agglomerations over 100 000 inhabitants	R	Blue plan	▪ The quantity of wastewater produced by coastal agglomerations more than 100 000 inhabitants ▪ The quantity of wastewater treated before discharge into sea	This indicator is expressed in percentage of treated wastewater of the total wastewater produced.
36. Share of wastewater collected and treated	R	Blue plan	▪ Total amount of wastewater produced ▪ Total amount of wastewater collected from	

wastewater by the public sewerage system			collective networks ▪ Amount treated	
37. Share of industrial wastewater treated on site	R	Blue plan	▪ The total amount of wastewater generated by industrial facilities ▪ Amount of treated industrial wastewater treated on site	
38. Harbor equipment ratio in unballasting facilities	R	Blue plan	▪ Number of deballasting stations for cargo vessels ▪ The number of commercial harbours for a given period	This indicator is defined as the ratio of the number of deballasting stations for cargo vessels to the number of commercial harbours for a given period.
Drinking Water				
39. Share of distributed water not conforming to quality standards	S	Blue plan	▪ Total number of drinking water distribution units ▪ Number of water distribution units failing at least one conformity to drinking water quality	The water quality standards are those set nationally or according to the WHO limit values. Principle parameters include: E-coli, salinity, nitrates, iron, aluminum, fluorine, turbidity
40. Average water quality index	S	Blue plan	▪ Total number of samples analyzed ▪ Number of samples complying with the national standards	
41. Drinking water use efficiency	R	Blue plan	▪ Volume of drinking water leaving the treatment plant (includes leaks upstream of the users' meters)	

			▪ Volume of water distributed to the user including leaks at the user's premises ▪ Volume of water distributed to the user and subject to invoicing ▪ Volume of water invoiced for which payment is recovered from the user	
42. Access to safe drinking water	R	Blue plan	▪ The population with reasonable access to an adequate amount of safe drinking water (20 liters per day and per person as a minimum).	Reasonable access to water is defined as the existence of a water supply within the home or within 15 minutes walking distance.
Renewable Resource Management - water				
43. Exploitation index	P	Blue plan	▪ The sum of the volumes of the annual production of renewable natural fresh water for all uses, including losses during conveyance, for a given year. ▪ The volume of average annual flows of renewable natural water resources.	The indicators measures the relative pressure of annual production on conventional renewable natural fresh water resources. It expresses the degree to which renewable natural water is exploited at a given date.
44. Non-sustainable water production index	P	Blue plan	▪ Annual volumes taken from aquifers with non-renewable resources or arising from the overexploitation of water tables with renewable resources. ▪ The total annual volume of water	The indicator measures the proportion of the annual total volume of water withdrawals taken from fossil aquifer reserves or from water table overexploitations. It expresses how much the country is depending on non-

			withdrawals.	sustainable water resources.
45. Existence of economic tools to recover the water cost in various sectors	R	Blue plan	▪ Yes or no	This indicator gives information about the economic instruments (levies, taxes, duties etc) used to cover the cost of water for users in various sectors.
46. Water use efficiency for irrigation	R	Blue plan	▪ The number of irrigation methods used ▪ Area irrigated by a specific method ▪ Efficiency of each method ▪ Total area irrigated in the country for all methods	Average efficiency can be defined as the ratio between the quantities of water actually used by plants and the quantities of water brought to the plot. The average efficiency has to be estimated. Each country has its own estimates of average efficiency of the various systems, based on experimental testing sites.
47. Annual consumption of ground water	P	Arab League (1996)	▪ The total volume of fresh water available annually. ▪ The annual consumption of ground water. ▪ The annual consumption of surface water. ▪ The spillage losses. ▪ The return flows.	The total annual consumption of ground and surface water is calculated to include spillage losses, consumer usage plus the return flows, as an annual percentage of the total average volume of fresh water available annually.
Land Management (Renewable Resource Management - land, or possibly land use/land cover. Could relate to non-point source water pollution, energy use in transportation, agriculture, etc.)				
48. Urbanizatio	S	Blue plan	▪ Urban population.	

n rate			▪ Total population.	
49. Land use change	S	Blue Plan	▪ Area of artificialized land ▪ Area of agricultural land. ▪ Area of forest and milieu. ▪ Area of wetlands. ▪ Area of water surfaces.	This indicator describes changes, over time, in the distribution of land use categories within a country. It actually consists of a matrix of transition indicators, for a given period, from a type of land use towards another type of land use, expressed in area units.
50. Relative evolution of arable land	P	Blue Plan	▪ Area of arable land in a specific year. ▪ Area of arable land in a reference year.	
51. Land affected by desertificati on	S	Blue Plan	▪ The calculation of this index is based on prior estimations carried out by UNEP, FAO, etc, as well as a need to index lands according to their desertification potential	
52. Wetland Area.	S	Blue Plan	▪ Total area of wetlands	Wetlands are there defined as " non wooded area either partially, temporarily or permanently water-logged, the water of which may be fresh, brackish or saline, on blanket or raised peat lands. The water may either by stagnant or running, and is usually shallow".
Renewable Resource Management - fisheries				
53. Value of halieutic catches at	P	Blue plan	▪ The total annual value of sea fish catches	

constant prices				
54. Number and average power of fishing vessels	P	Blue plan	▪ Number of fishing vessels per year. ▪ Average power of fishing vessels.	The average power corresponds to the total engine power of vessels, expressed in stream horsepower, divided by their number.
55. Fishing production per broad species groups	S	Blue plan	▪ Quantities of fish caught which lie in the open sea (pelagic) or close to the bottom (demersal) in the Mediterranean.	
56. Aquaculture production	S	Blue plan	▪ Total volume of sea fish produced at national level by fish farming	
57. Share of fishing fleet using barge.	P	Blue Plan	▪ The engine power of trawlers. ▪ The total engine power for the motor fishing fleet.	The indicator is defined by the ratio of engine power (steam horse power) of trawlers out of the total engine power for the motor fishing fleet.
58. Public expenditure on fish stocks monitoring	R	Blue plan	▪ Investment expenditure ▪ Current expenditure ▪ Subsidies to private sector ▪ Receipt from by products ▪ Fees/ charges from private sector	This indicator is concerned with the annual amount of public expenditure made to assess and monitor sea fish stocks
Agriculture (renewable resource management - soil, arable land?)				
59. Ratio of land exploitation.	P	Blue Plan	▪ Total area of agricultural land. ▪ Total area of land that has the potential to be	The main difficulty of this indicator is in assessing the area of land that has the potential to be cultivated. This

			cultivated.	estimate must be made by the country according to criteria which reflect the pedological features of the soil (fertility) and current growing techniques, in order to ensure economically viable production.
60. Share of irrigated arable land.	P	Blue plan	▪ Total irrigated area, equipped to provide water to the crops. ▪ Total area of cultivated arable land.	Irrigated areas include areas equipped for full and partial controlled irrigation, spate irrigation areas, and fitted wetland or inland valley bottoms.
61. Use of agricultural pesticides	P	Blue plan	▪ The use of pesticides per unit area of agricultural land ▪ Total area of agricultural land	
62. Use of fertilizers per hectare of arable land	P	Blue plan	▪ Area of agricultural lands in a given year. ▪ Fertilizers consumption in the same year.	Fertilizers products include fertilizers based on nitrogen, potassium and phosphorus. The growing period (in Egypt it could be considered as the whole year) is used as time frame for calculating fertilizer consumption. The total area of agricultural lands (permanent and temporary) is defined as the sum of “arable land” and “permanent crops” land.
63. Agriculture	P	Blue plan	▪ The consumption of irrigation water.	***could also be classified with water***

water demand per irrigated area			▪ The total irrigated area in the country	***management*** This indicator is defined by the ratio of irrigation water consumption to the irrigated area in the country. It is expressed by m^3/ year/ ha
64. Arable land per capita	S	Blue plan	▪ Arable land area. ▪ Total population.	Arable land is land give over a temporary crops" double-cropped areas are counted only once), temporary meadows for mowing or gazing, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included.
Non-Renewable Resource Management - minerals				
65. Intensity of material use	S	Blue plan	▪ The production of virgin metals processed from ores (aluminum, iron, copper, lead and nickel) ▪ The quantities of metals resulting from recovery of metal waste ▪ The imports of the virgin metals	The indicator is defined as the total annual consumption of virgin metals by volume per unit of gross domestic product for the reference metals: aluminum, iron, copper, lead and nickel
66. Number of mines and quarries rehabilitated after	R	Blue plan	▪ Total number of worked out mines and quarries ▪ Number of	

exploitation			rehabilitated mines and quarries	
Non-renewable Resource Management - energy (could also fall within air pollution)				
67. Energy intensity	P	Blue plan	▪ Rate of energy consumption in tons equivalents. ▪ Gross Development Product.	The indicator is defined as the rate of energy consumption per unit of GDP.
68. Annual energy consumption per capita	P	Blue plan	▪ The amount of energy used in a given year in tons oil equivalent per capita.	The amount of energy measured could be liquid, solid, gas or electricity.
69. Energy balance	P	Blue plan	▪ Total energy produced during a given year. ▪ Distribution of energy produced by different sources (solid fuels, liquid fuels, gaseous fuels and prime electricity) ▪ Total energy consumption during the same year. ▪ Distribution of energy consumption by sources	
70. Share of consumption of renewable energy sources	R	Blue plan	▪ Total energy consumption in a given year ▪ Amount of renewable energy consumed in the same year	Renewable resources relates to energy collected from current ambient energy flows or from substances derived from them.
Protected areas				

71. Public expenditure for the conservation and value enhancement of natural, cultural and historical heritage	R	Blue plan	▪ The investment expenditure ▪ Current expenditure ▪ Public subsidies ▪ Receipts from by-products ▪ Fees/charges from private sector	- The investment expenditure: is the expenditure used for enhancement of durable goods financed by the public sector. - Current expenditure: the expenditure used for processing, rents, wages, energy , maintenance of goods and services for heritage under public management. - Public subsidies: is defined as the financial transfers of the public sector towards the private one aiming at conservation of heritage under private management - Receipts from by-products: where patrimonial estate, under public management entails receipt from selling a by product of its activity such as postcards, books etc - Fees/charges from private sector such as taxes that are directly used for financing conservation.
72. Total expenditure	R	Blue Plan	▪ Total maintenance expenditure and material,	Expenditure on protected areas

on protected areas manageme nt.			human and financial expenditure, devoted to the management of protected areas.	management include: expenditure directed at protection and rehabilitation of species, landscapes and habitats in the protected area; expenditure for the related activities of monitoring and administration. Excluded are expenditures of which the immediate aim is not safeguarding of species or their habitat, but is mainly for technical, hygiene or internal security reasons.
73. Protection of specific ecosystems	R	Blue plan	▪ The area of protected zones which involves marine environment ▪ The number of protected marine sensitive areas	Sensitive areas are coastal and estuarine water with natural socio-economic value which are regarded as sensitive if they are exposed at the higher risk to undergo harmful impacts due to human activities.
74. Ratio of protected areas to the total area	R	Arab League (1996)	▪ Total land surface. ▪ Protected land surface including fresh water & protected sea areas.	This indicator comprises the percentage of protected land (inc. fresh water areas) from the total land surface as well as protected sea areas as a percentage of the total marine area.
Biodiversity/Ecosystems				
75. Number of turtles caught per	P	Blue Plan	▪ Number of marine turtles caught in the Mediterranean per year.	

year.				
76. Threatened species.	S	Blue Plan	▪ Number of threatened species. ▪ Total number of native species.	The indicator measures the number of threatened species in proportion to the total number of native species. Threatened species are those at risk of extinction, and include endangered, vulnerable, rare, and indeterminate species as defined by International Union for Conservation of Nature.
Coastal Zone Development and Tourism				
77. Number of moorings in yachting harbours	P	Blue plan	▪ The number of sailing harbours (sea and lakeside) ▪ Number of moorings in the country's sailing harbours in a given year	
78. Population growth rate in coastal areas	S	Blue plan	▪ Coastal areas population at different periods.	Population growth rate is defined as the average annual rate of change of population size during a specified period.
79. Population density in the coastal areas	S	Blue plan	▪ Permanent coastal areas population (for a given unit time) ▪ Surface area of coastal areas.	The population density in coastal areas is defined as the ratio of the permanent population in the coastal area to its surface area.
80. Coastline erosion	S	Blue plan	▪ The total coastline ▪ Withdrawal of shoreline in the different	The indicator is defined as the proportion of the coastline subject to erosion processes

			areas	expressed as a percentage of the total coastline
81. Surface of coastal protected area	R	Blue plan	▪ Total area of protected coastal zones.	The total area of the protected zone is taken into account even though the coastal part may often only represent a small proportion of the whole.
82. Oil tanker traffic	P	Blue plan	▪ The total number of cargo vessels entering in commercial harbours or into any port facility that can accommodate oil tankers (1) ▪ The number of oil tankers (2) ▪ The annual quantity of oil products unloaded from these tankers in the harbours (3)	The indicator is expressed as the relation between 2/1 and is expressed in number per year. And is expressed in (3) by thousands tons/year.
83. Public expenditure on tourism site conservation	R	Blue plan	▪ The amount of total net public expenditure allocated to the conservation and development of places of interest	Places of interest such as cultural, historical and natural patrimony
Transportation (re air pollution? energy consumption? sprawl/land management/runoff?)				
84. Density of the road network	S	Blue plan	▪ Total length of roads in the country. ▪ The total area of the national territory	Roads include motorways, main or trunk roads, secondary or regional roads
85. Share of collective transport	R	Blue plan	▪ Number of trips using collective transport ▪ The total number of	This indicator is defined as the ratio of the number of

			trips	movements using collective transport to the total number of movement. Means of collective transport include bus, rail transport and domestic air transport. The
86. Number of passenger cars per 100 inhabitants	P	Blue plan	▪ Number of passenger cars. ▪ Total population.	Passenger cars are those with no more than 9 seats including hire cars, taxis jeeps, estate cars and other light transport mixed-use vehicles.
Disaster Prevention and Management?				
87. Number of sites with high Risk.	p	Blue Plan	▪ Number of high-risk sites for the environment as identified in national regulations.	The indicator measures the number of facilities deemed to be potentially dangerous in accordance with national regulations. This notion depends to a very great extent on the regulations in force in the country. For example, it is widely acknowledged that nuclear sites, hydroelectric dams, underground hydrocarbon and gas storage sites, chemical and petro-chemical industrial facilities, are industrial facilities “at risk”. Certain trade activities require the use of storage sites for dangerous substances and may also be classed in the “ at risk”

				category.
88. Economic impact of natural disasters.	S	Blue Plan	▪ The Gross National Product (GNP) ▪ The annual cost of natural disasters at national or local level.	This indicator is defined as the annual cost of natural disasters at national or local levels, as a percentage of GNP.
89. Existence of intervention plans	R	Blue Plan	▪ Whether or not there is regulations setting up an obligation to implement one or more special response plans for sites with major technological risks in order to best organize the application of assistance and control resources in case of an accident.	This indicator has the purpose of stating the existence or otherwise of the regulations referred to the neighboring column, within the country's legislation.
"Level of Effort" in environmental protection				
90. Employment linked to the environment.	R	Blue Plan	▪ Total number of jobs. ▪ Total number of jobs directly connected to the environment in services. ▪ Total number of jobs directly connected to the environment in industry. ▪ Total number of jobs directly connected to the environment in farming.	Jobs directly connected with the environment involve all public and private bodies, which produce goods and services used directly for preserving the environment or for controlling pollution.
91. Number of associations involved in environment and/or sustainable development	R	Blue Plan	▪ The number of national or local associations that have the purpose of promoting sustainable development or conserving the environment in general or of one of its components in particular.	By an association is meant any coalition, or any voluntary grouping up by several persons who unite for a common activity. An association need not operate for purpose of gain or profit in which case it is to be a company.
92. Number of	R	Blue Plan	▪ The number of companies who have the	This indicator is defined as number of

enterprises engaged in "Environment Management" processes.			ISO 14000. ▪ The number of companies who have the European Environmental Management System.	companies who have committed themselves to environmental initiatives. These initiatives are formalized by one of the current tools: the ISO 14000 standard series or the European Environmental Management System.
93. Public expenditure on environmental protection as a percent of GDP.	R	Blue Plan	▪ The amount of public expenditure devoted to environment protection. ▪ The Gross Domestic Product (GDP).	Environmental protection expenditure is the expenditure actually incurred to prevent, reduce and eliminate pollution, and other environmental damage. General administration expenditure, the costs of monitoring previously mentioned activities, and the costs of monitoring the environment, are all included.
94. Existence of environment national plans and/or sustainable development strategies.	R	Blue Plan	▪ Whether or not there are national plans on the environment or a national strategy on sustainable development.	
95. Number of Agendas 21 adopted by local authorities.	R	Blue Plan	▪ The number of local authorities within the country that adopted Agenda 21.	

[i] This column characterizes each proposed indicator according to its place in the commonly used pressure-state response framework, with P = Pressure, S = State, R = Response.